Sugarcane Fertilizer Recommendations

R. Johnson, H.Viator, B. Legendre

Essential Nutrients

- Nitrogen
- Phosphorous
- Potassium
- Calcium
- Sulfur
- Magnesium

- Micronutrients

Zinc, Boron, Manganese, Molybdenum, Chlorine, Copper , Iron

Phosphorus (P_2O_5)

- About 1 lb is removed per ton of cane
- Availability depends on pH and soil type
- Soil Test Recommendations:

Soil Test	Plant	Stubble
Very Low	50	60
Low	45	50
Med.	40	40
High	0	0
Very High	0	0

Potassium (K_2O)

- About 3 lbs removed per ton of cane
- Natural abundance depends on soil type
- Soil Test Recommendations:

Soil test	Plant	Stubble
Very Low	130	140
Low	110	120
Medium	80	80
High	0	0
Very High	0	0

Sulfur (S)

- Stubble Cane more likely to respond
- Response more likely on heavy soils
- Apply 24 lbs Sulfur per acre if recommended by soil test.

Managing Soil Acidity

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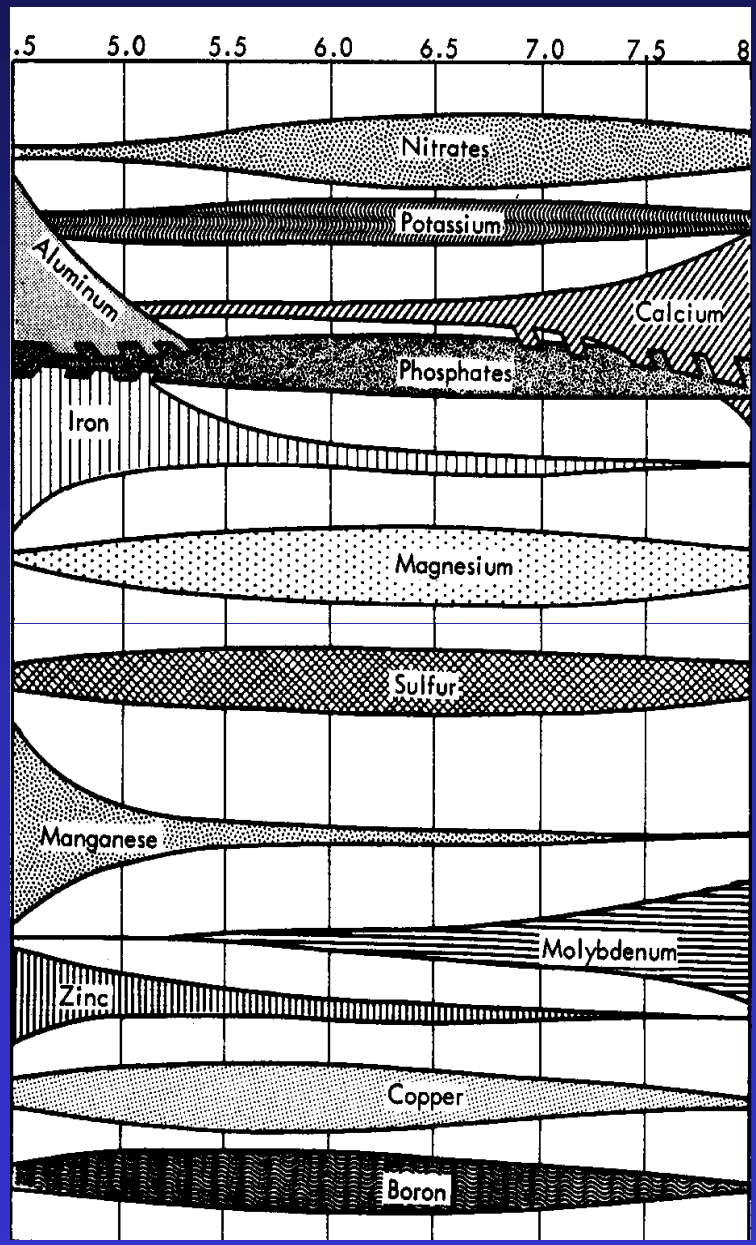
Why should we apply lime ?

- To reduce aluminum and manganese toxicity.
- To correct Magnesium Deficiencies (Dolomitic Lime, i.e. $MgCO_3$ vs. $CaCO_3$).
- To enhance the activity of soil microorganisms.
- To improve the activity of soil applied herbicides.
- ***To improve fertilizer use efficiency by maximizing nutrient availability.***

Effect of Soil pH on Nutrient Availability



Why does the soil pH decrease?

- Application of ammonia or urea-based nitrogen and phosphorus fertilizers will decrease soil pH levels over time (32% UAN, ammonia nitrate, urea, DAP).

  It takes 55 lbs of pure $CaCO_3$ to neutralize the acidity from 100 pounds of 32% UAN and 70 pounds of $CaCO_3$ to neutralize 100 pounds of DAP.

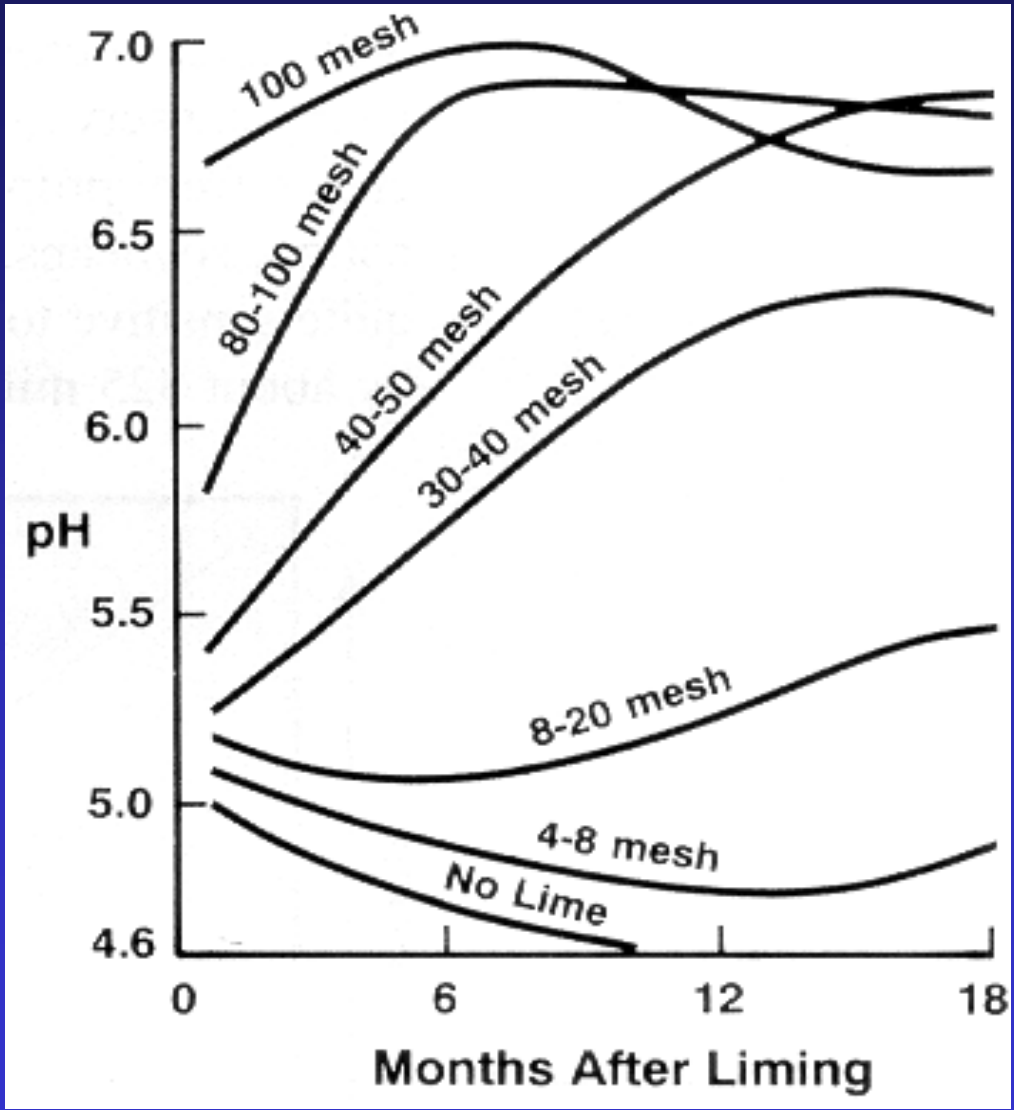
- Soil pH will also decrease due to crop uptake of K Ca and Mg. Hydrogen (H) will replace these cations on the soil exchange surface.

When and how should I apply lime?

Lime when:

- Soil pH < 5.8 on sandy loam & silt loam soils.
- Soil pH < 5.2 on clay loam & clay soils.
- Broadcast lime to fallow fields, or in fall or winter.
- The lime rate should be based on soil test and ideally should raise soil pH to 6.5.
- **Apply lime after precision leveling.**
- Variable rate lime application may more accurately target problem pH areas and ultimately save money.

How long will it take for the lime to work?



- The biggest change will occur within 3-4 months. The pH may continue to increase for 6-12 months.
- Smaller lime particles, will react more quickly than larger particles. Larger particles will not change soil pH as quickly, but may provide pH control (buffering capacity) over a longer period of time.

USDA Lime Test Results, Naquin Farms 2002-2004, LCP 85-384.

Treatment	Cane T/A	TRS lb/T	Sugar lb/A	Cane T/A	TRS lb/T	Sugar lb/A	Cane T/A	TRS lb/T	Sugar lb/A
	Plant			1st Stubble			2nd Stubble		
No Lime	27.1	199.8	5456	33.2	218.0	7219	24.0	241.3	5795
Conv.* Lime	34.0	199.8	6833	36.3	221.0	8031	28.0	236.6	6600
Increase	+6.9	0	+1377	+3.1	+3.0	+812	+4.0	-4.7	+805
LSD (5%)	2.8	NS	622	2.8	5.2	483	1.4	4.6	351

3 year total = 2,994 lbs sugar and 14 tons of cane. Return ~ $300.00
1 ton of lime (2002) = $24.50. Return on investment ~1200% (-appl. costs)
(Conventional Lime = uniform broadcast application at 1 ton/acre.)

Nitrogen Fertilizer Research

R. Johnson, H.Viator, C. Kennedy, A. Arceneaux

USDA, Nitrogen Fertilizer Experiments - 2007

- Locations:
  - Rosedale Plantation – L97-128 - November 6, 2007
  - Naquin Farms – HoCP 96-540 - November 26, 2007
  - Laurel Valley – Ho 95-988 - December 4, 2007
  - St. Louis Planting - CP 89-2143 - December 6, 2007

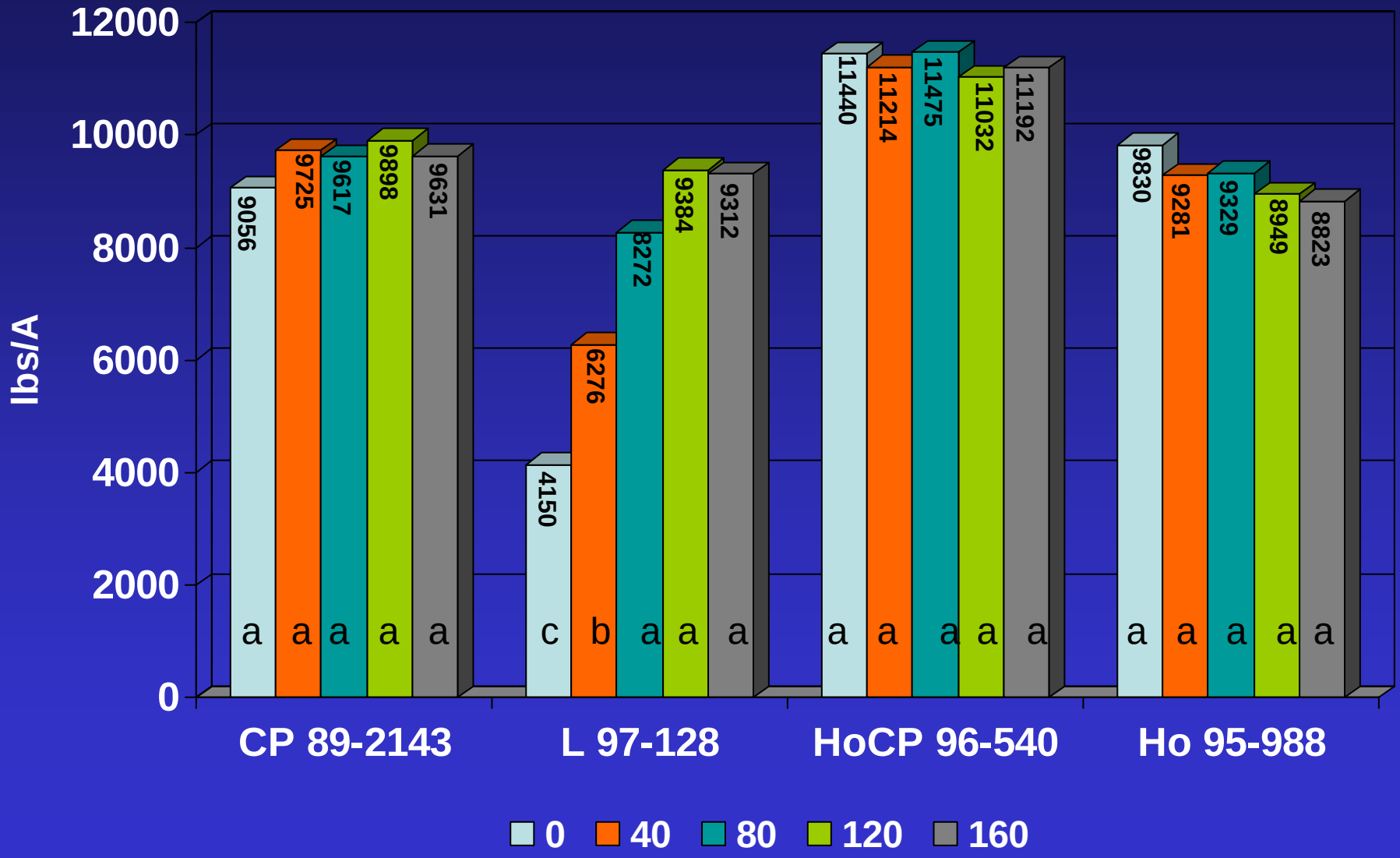
- Treatments:
  - Plant cane, 1st stubble
  - 3 rows x 50-ft, 6 reps
  - 0, 40, 80, 120, 160 lbs N/A (32% UAN)

LSU Nitrogen Fertilizer Experiments

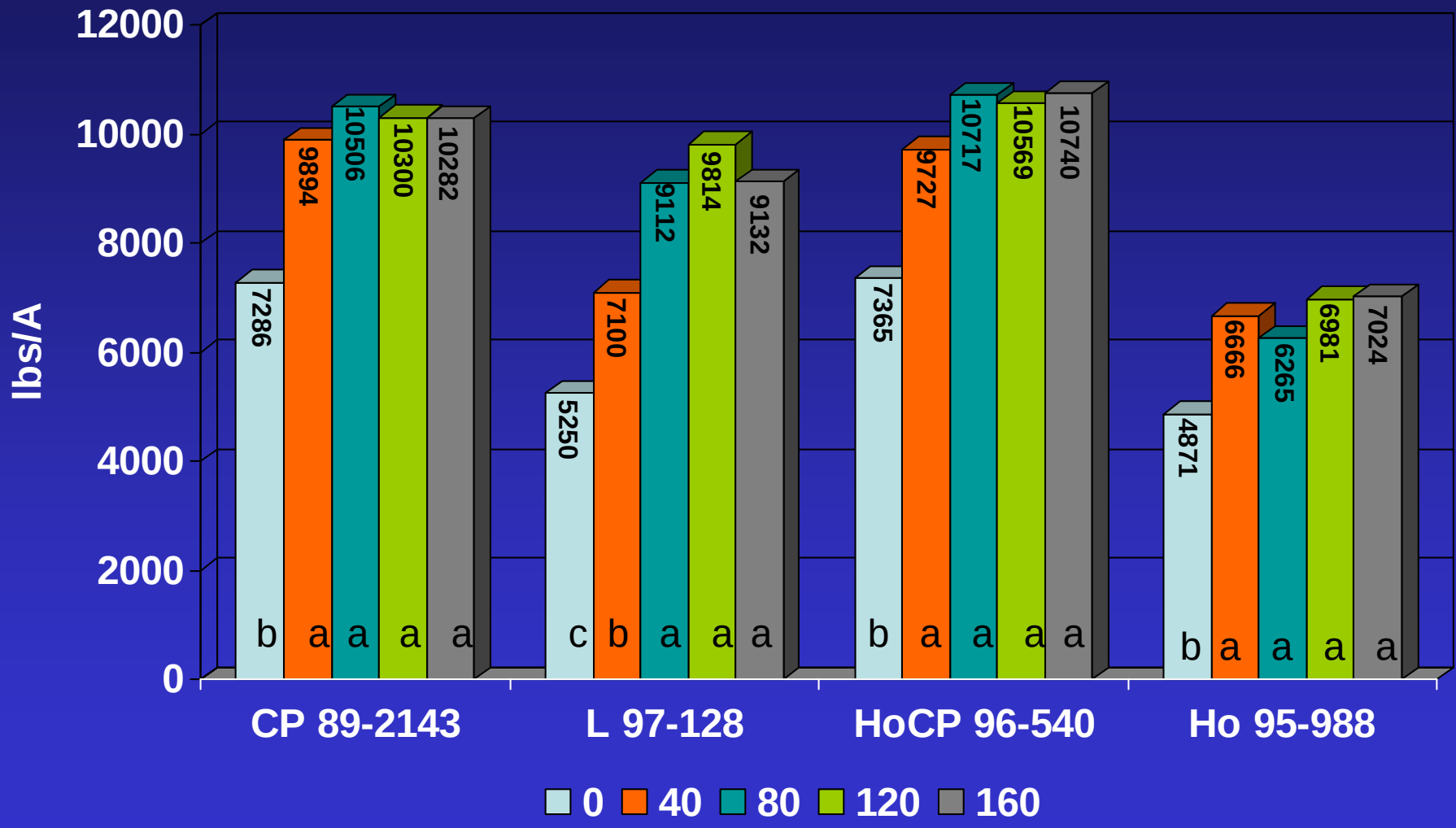
- Ronald Hebert, Jr., Patoutville, LA
  - L 99-226, L 99-233, - 1st stubble.
  - 3 rows x 30-ft, 6 reps
  - 40, 80, 160, 240 lbs N/A (32% UAN)

- LSU, St. Gabriel, LA
  - LCP 85-384, Ho 95-988, L 97-128, - Plant-cane, 1st Stubble, 2nd stubble (Harvest November 8, 2007)
  - L 99-226, HoCP 96-540, LCP 85-384, - Plant-cane (Harvest November 19, 2007)
  - 4 rows x 46-ft, (2 center rows for harvest), 4 reps
  - 0, 40, 80, 120 lbs N/A (32% UAN)

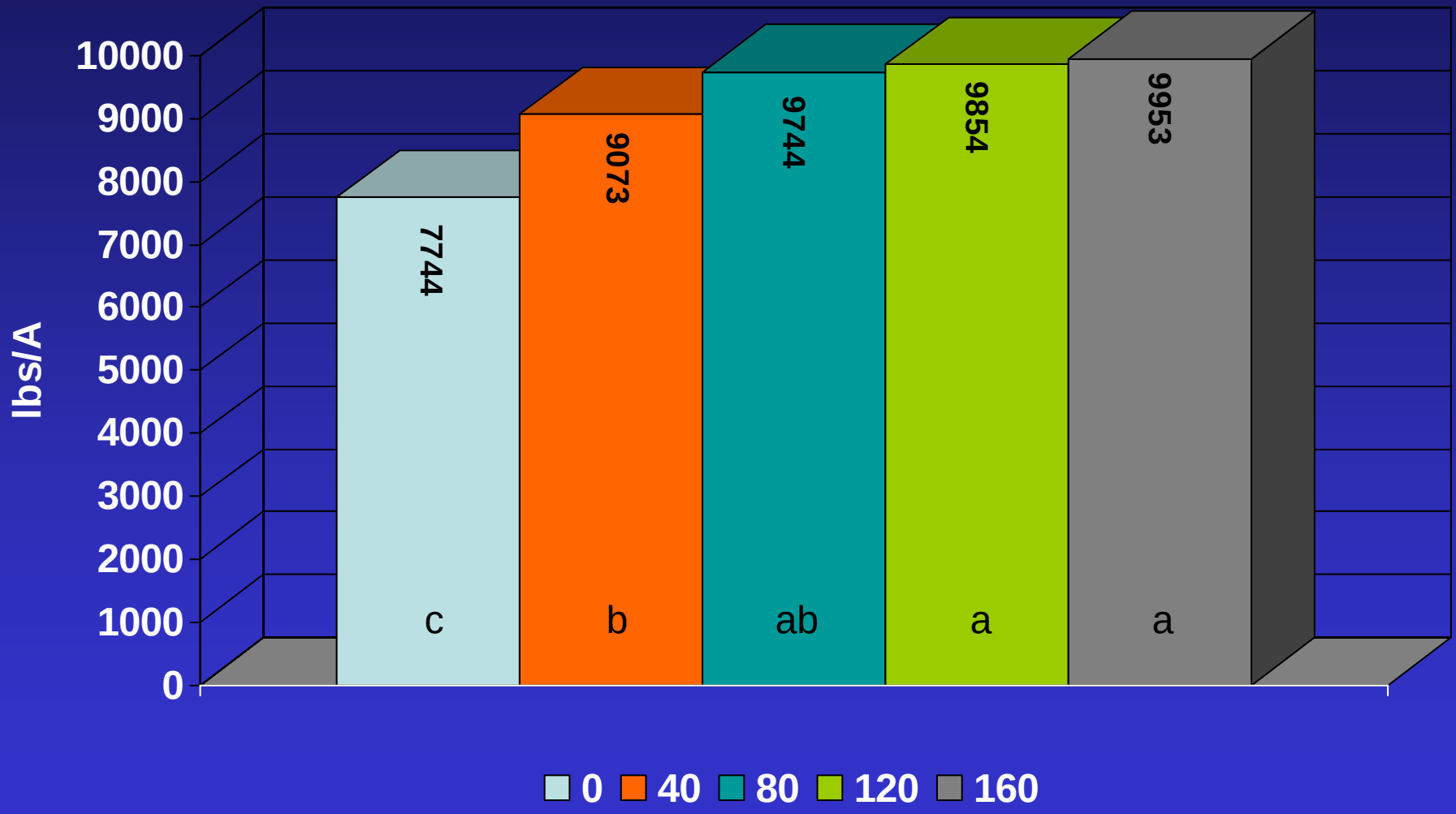
Varietal Response to Nitrogen Fertilizer (Sugar/A) Plant Cane



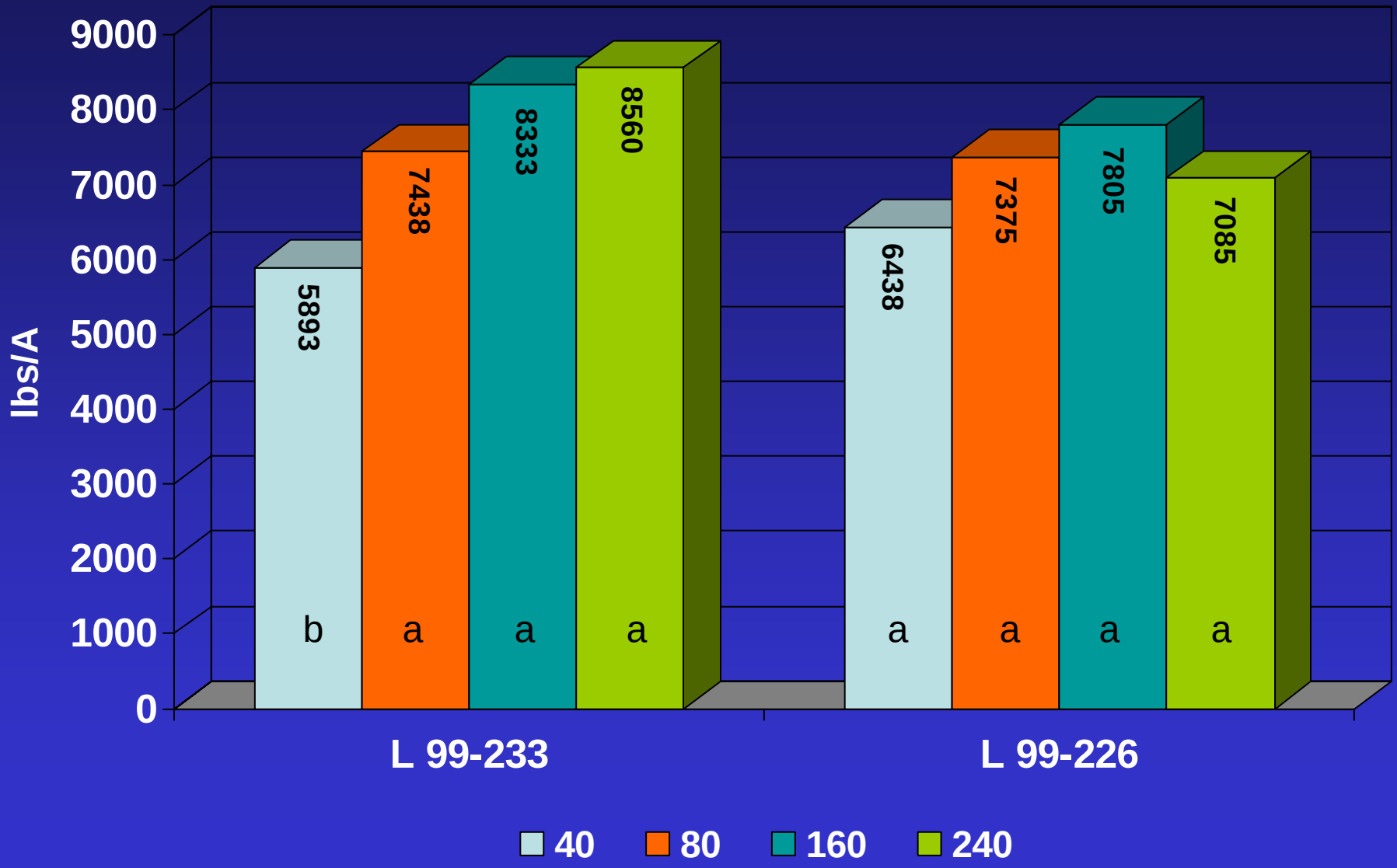
Varietal Response to Nitrogen Fertilzier (Sugar/A) 1st Stubble



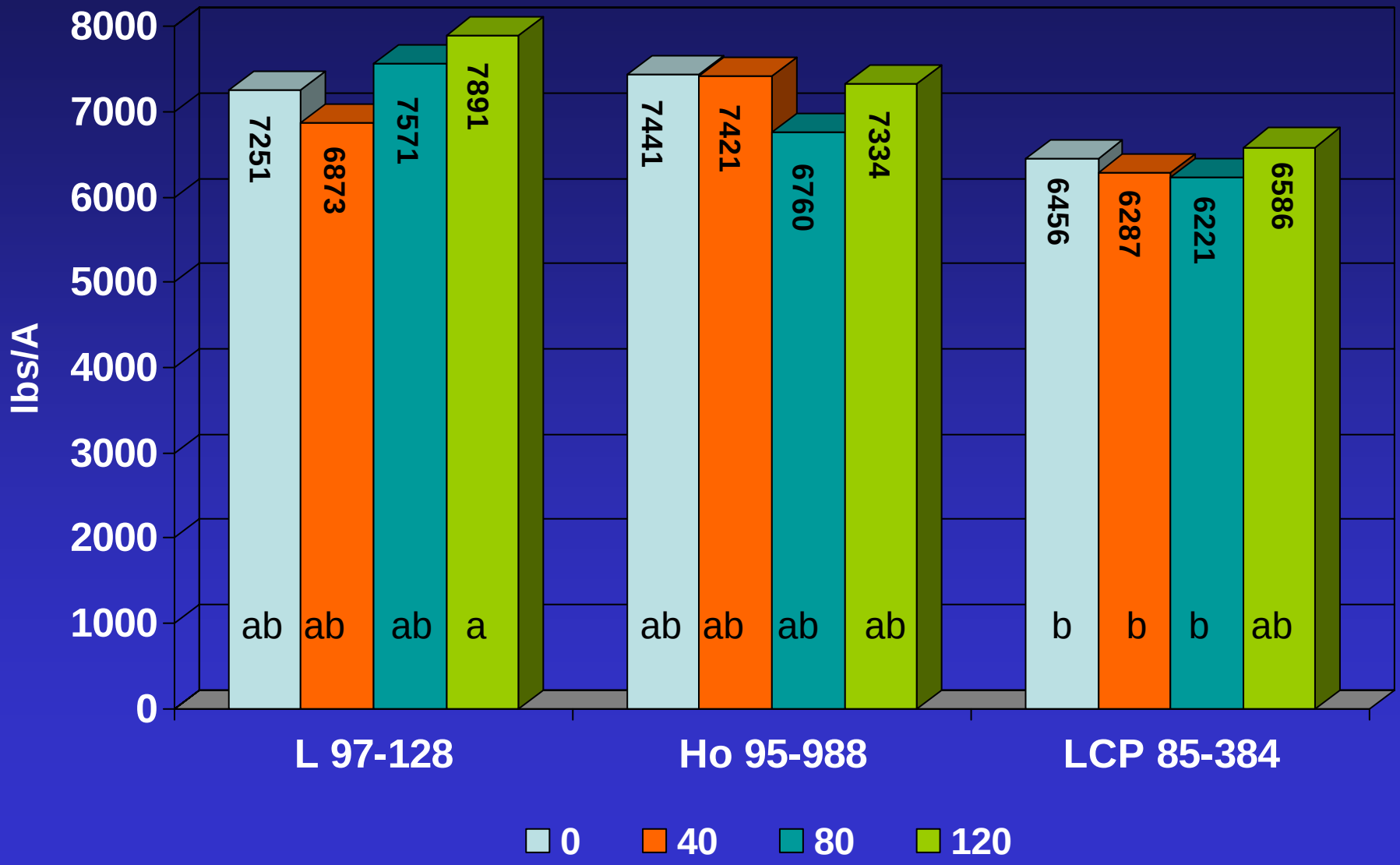
Effect of Nitrogen Fertilzier on Sugar Yields/A (Averaged over Variety and Crop)



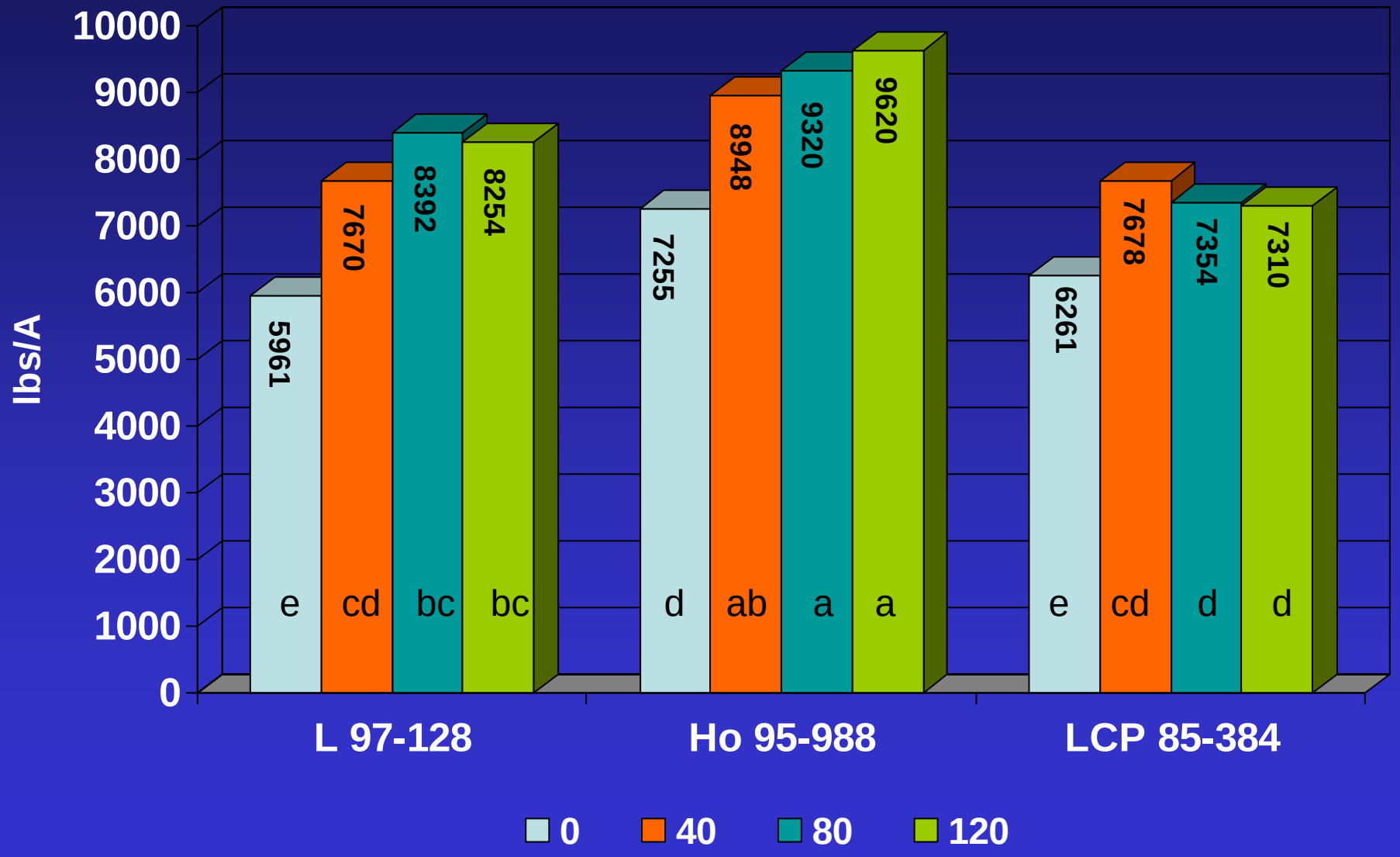
Varietal Response to Nitrogen Fertilizer (Sugar/A) 1st Stubble



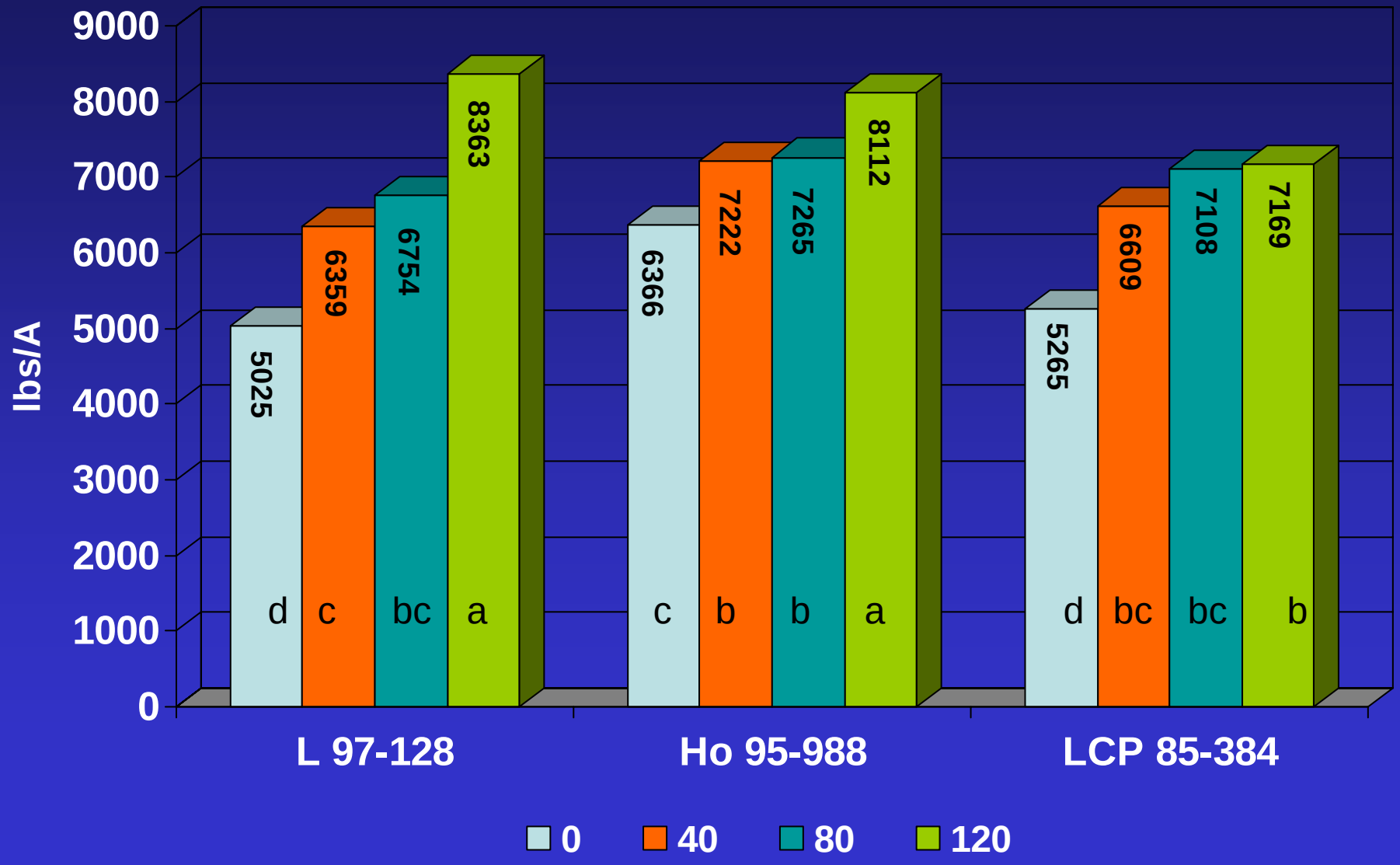
Varietal Response to Nitrogen Fertilizer (Sugar/A) Plant Cane, St. Gabriel



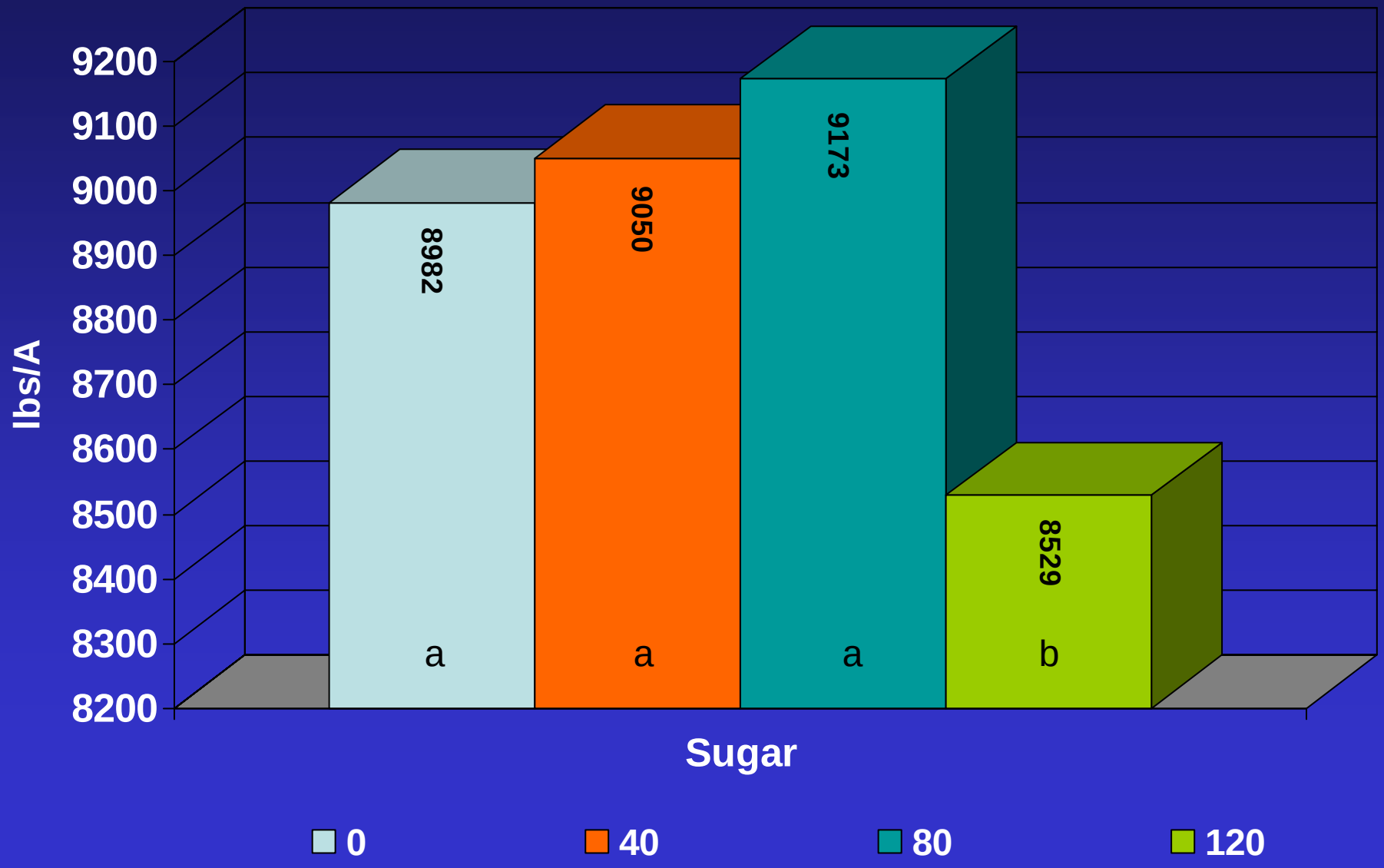
Varietal Response to Nitrogen Fertilizer (Sugar/A) 1st Stubble, St. Gabriel



Varietal Response to Nitrogen Fertilizer (Sugar/A) 2nd Stubble, St. Gabriel



Effect of Nitrogen Fertilizer on Sugar Yields/A, Plant Cane, St. Gabriel



Summary of Nitrogen Studies

- **Optimum N Rate – 80 lb N/A**
  Plant cane and 1st stubble

- **Optimum N Rate – 120 lb N/A**
  2nd stubble

Nitrogen Fertilizer Recommendations for 2008

- **Plant cane:** light soils:
  - Old 80-100 lb
  - New 60-80 lb N/A
- **Plant cane:** heavy soils:
  - Old 100-120 lb
  - New 80-100 lb N/A
- **Stubble cane:** light soils:
  - Old 120-140 lb N/A
  - New 80-100 lb N/A
- **Stubble cane:** heavy soils:
  - Old 140-160 lb N/A
  - New 100-120 lb N/A

- **Old recommendations based on ~ 300 tests over 26 year period (1953-1979) when anhydrous ammonia was the primary nitrogen fertilizer used.**
- **New recommendations based on recent tests (~ 28) in which UAN 32% was the primary nitrogen fertilizer used.**


Questions ?